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# SCIENCE NEWS LETTER

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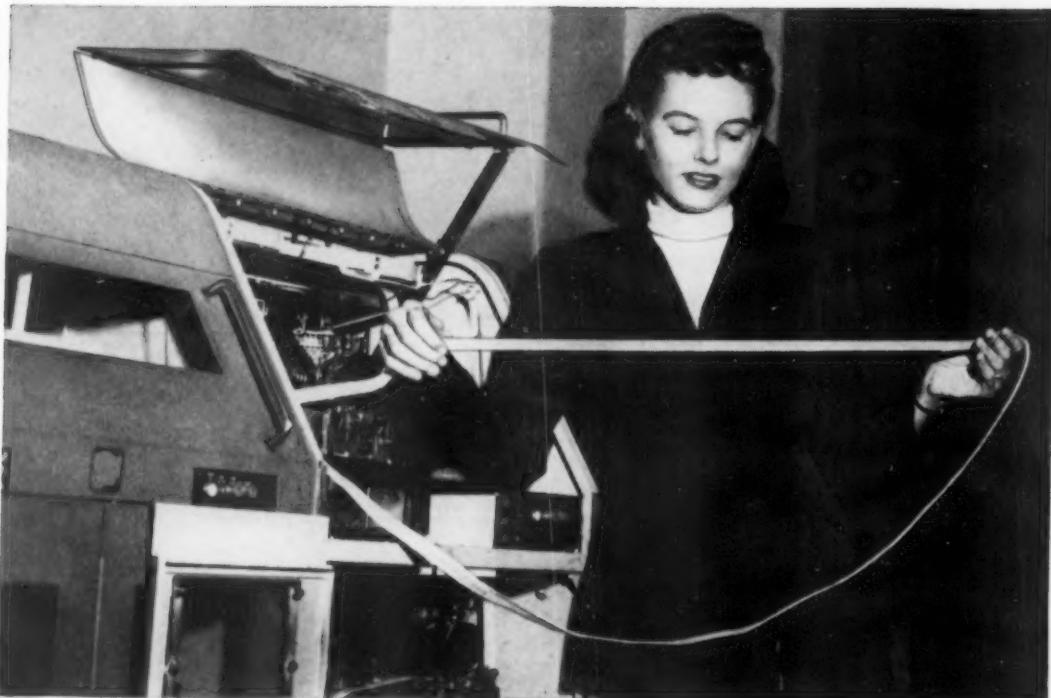
THE WEEKLY SUMMARY OF CURRENT SCIENCE

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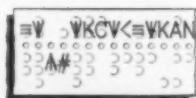
## *These signals find the way*



SENDING



RECEIVING



When you dial a telephone number, high-speed switching mechanisms select your party and connect you. Through a new development of Bell Telephone Laboratories, similar mechanisms do a similar job in private wire teletypewriter systems which America's businesses lease from the telephone company.

Company X, for example, operates an air transportation business with offices all over America. At one office, an operator wishes to send a message, let us say, to Kansas City. Ahead of the message, she types the code letters "KC". The letters become electric signals which guide the message to its destination.

Any or all stations in a network, or any combination of stations, can be selected. Switching centers may handle 50 or more messages a minute... some users send 30,000 messages a day. Delivery time is a few minutes.

Defense manufacturers, automobile makers, airlines and many other American businesses are benefiting by the speed and accuracy of the new equipment—another example of how techniques developed by the Laboratories for telephone use contribute to other Bell System services as well.

### BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in scientific and technical fields.



## ASTRONOMY

# Shrink Universe Yardstick

**Milky Way galaxy is probably farther from nearby galaxies than previously thought. New estimates of interstellar distances are now possible.**

► THE YARDSTICK by which astronomers measure distances in the universe may have to be changed, Dr. Harlow Shapley of Harvard College Observatory told members of the American Astronomical Society meeting in Amherst, Mass.

Our own Milky Way galaxy is probably farther from nearby galaxies of millions of stars and nebulae than previously realized, Dr. Shapley stated. This means that the expanding universe is even larger and older than previously estimated, and is expanding at a much slower rate.

Clusters of stars in our own and other galaxies are proving to be incredibly bright. Those recently studied average about 100,000 times as bright as the sun, Dr. Shapley estimates. It is these star clusters and individual variable stars of the Cepheid type that help astronomers estimate distances in the universe.

The new values would place the Larger and Smaller Magellanic Clouds so far away that the light now received from them started on its way toward our galaxy and the earth about 150,000 years ago. It would place the Andromeda nebula, a giant starry pinwheel believed to look much like the Milky Way galaxy to which we belong, so far away that light from it reaches us after 1,500,000 years. This would also mean that the Andromeda nebula is about twice as large as previously thought.

The new estimates of distance have become possible through the establishment of accurate photoelectric magnitude standards in the Magellanic Clouds by Dr. Uco van Wijk and Dr. Ivan King while at the South African Harvard station, Dr. Shapley explained. Equally important was a special series of photographs made with a midget telescopic camera of only six inches focal length.

"Ever since a number of the star clusters in the two Magellanic Clouds were identified at Harvard as probably globular like the Hercules cluster and other globular clusters in our own galactic system," Dr. Shapley pointed out, "we have been disturbed by the apparent discrepancy in luminosity between the clusters of the Clouds and those of our Galaxy."

If the globular clusters in our own Milky Way, in the Magellanic Clouds and in the Andromeda nebula are equally bright, then the Cepheid stars are distinctly more luminous than heretofore measured, Dr. Shapley stated. We must therefore increase the distances to the Clouds very perceptibly to make the absolute luminosities of the groups of clusters agree.

"If we increase the scale of distances, the rate of recession of the galaxies at a given

distance from the observer will be decreased," Dr. Shapley said. "As a result, the age of the expanding universe will be increased and brought more nearly into agreement with the evidence of the age of the rocks on the earth's surface."

"These drastic revisions should not be considered final," Dr. Shapley stated. "The data are too few. The revision can be tested in various ways and appropriate investigations are under way at Mount Wilson-Palomar, Leiden, Harvard and elsewhere. The Magellanic Clouds may further contribute, through the discovery of faint Cepheid variable stars, to the unraveling of the current puzzle of the scale of the Metagalaxy."

Science News Letter, January 10, 1953

## PSYCHOLOGY

## Star Actor's Isolation From Others Important

► A STAR actor's isolation from other actors and from walls on the stage is more important than the position where he is standing.

This is one of the findings of psychologists at Cornell University, Ithaca, N. Y., who are testing some of the traditional rules of the theater about where an actor should stand on a stage. To make their tests, they used a miniature stage peopled by black pins.

Two rules "seem doubtful." These are "the belief that upstage is more important than downstage, and that the left creates a different mood from the right."

In the tests, the black pins were placed in various positions on the stage and student observers, with and without stage production experience, were asked to point out the "star." Choices of both groups were about the same. The experiments were conducted by Mrs. Carol Barnes Hochberg, Julian Hochberg and Herman M. Harvey.

Science News Letter, January 10, 1953

## MEDICINE

## Spot Pneumonia Types By Infrared Light

► THE SUGARY outer coats of pneumonia germs, which determine the types of the germs such as Type I, Type II and so on, absorb infrared light in characteristically different ways.

This finding, important in the study of the chemistry of disease germs and of immunity to them, is announced by Drs. Heber J. R. Stevenson and Seymour Levine of the U. S. Public Health Service's Environmental Health Center, Cincinnati, in *Science* (Dec. 26, 1952).

Science News Letter, January 10, 1953



**ON STAGE TESTING**—Checking up on the theater's traditional rules about what part of the stage gives an actor the most attention, Mrs. Carol Barnes Hochberg has an observer judge which mannikin is the "star" of the show.

## VOLCANOLOGY

# Volcano Makes Mud Rain

**Oceanographer and naturalist-photographer are first men to set foot on San Benedicto Island where new volcano, El Boqueron, belched forth last summer.**

► TWO SCIENTISTS sat on the edge of an erupting volcano on San Benedicto Island, and are alive to tell the tale. They even have pictures to prove it.

The two men, oceanographer Adrian Richards and naturalist-photographer Lewis W. Walker, were the first men to set foot on this desolate Pacific island off the tip of lower California since last summer, when El Boqueron, the volcano, blew itself into existence. (See SNL, Sept. 27, 1952, p. 195.)

They hit the beach Dec. 9 and spent two days studying the volcano. They not only scaled its sides between eruptions, but sat inside its crater a few feet distant from volcanic rocks "hot enough to roast marshmallows." They also got night color pictures of a glowing delta of lava at the crater's base, an eerie vision in white, red and orange flame.

It took them an hour and a half to ascend from the beach to the crater's rim, 1,250 feet above sea level. At times they were up to their knees in the fine volcanic ash that blankets the island.

As they gazed out from the rim they saw a saucer-like bowl, half a mile wide and 300 feet deep. The floor was broken up into two circular mottes, one inside the other.

"When we got to the rim," said Mr. Richards, "we heard a roar such as you would expect from a hundred jet airplanes." He explained the noise was connected with high-pressure steam or gas emissions from a rock pile near the point where they reached the rim.

While Mr. Richards, a graduate student at Scripps Institute of Oceanography in La Jolla, was studying the strange new spectacle, Mr. Walker was roaming around the bottom of the crater with camera and tripod in hand. He noticed his feet were getting so hot he had to keep moving them. He looked down at one of the legs of his tripod and noted it was charred.

Suddenly, said Mr. Richards, a vent in the black inner circle of the crater began belching smoke. Soon the whole bottom of the crater was filled with black smoke which fortunately missed Mr. Walker, who was on the windward side.

Twice more, during the period of exploration, El Boqueron threw great clouds of smoke 3,000 feet into the air.

Their most interesting find, however, lay at the base of the volcano, where a hole was spewing out gigantic amounts of lava. As the blocks of red-hot lava met the sea they sent up a geyser of steam. In the two days the scientists were on the island, the delta formed by this lava grew from 700

feet in width to 1,200 feet. At the same time its mouth moved up the mountain from 140 feet above sea level to 192 feet.

At night the delta glowed like an artist's palette. Its color ranged from almost white heat at the mouth, through orange to nearly red where the blocks of lava reached the sea. The scientists estimated the temperature of the delta at 2,300 degrees Fahrenheit.

The scientists explained that they did not see any molten lava. The block lava does not melt but moves in tremendous landslides.

The scientists found their real action when they tried for close-up color pictures, after dark, of the gigantic lumps of orange-glowing lava sliding into the sea.

While Mr. Walker was busy taking pictures, pebbles started raining from the sky "by the bucketful." From previous observation the two knew these pebbles were the signal for a landslide. They were caught between the hot lava on one side and a pounding surf on the other—with a landslide coming up. They beat a fast retreat along a narrow beach and escaped.

Dog-tired, the men made camp at the base of the volcano. They were awakened at five in the morning by a shower of pebbles. The volcano was erupting. In five minutes the pebble shower turned into rain. The men gazed at each other in surprise, only to find they were both spattered with mud. The volcanic cloud had succeeded in precipitating atmospheric moisture, and had mixed with the rain to make mud.

"It was tough," Mr. Walker said. "If you looked up to see what was falling next, you got mud in your eye."

The daring scientists took the trip entirely on their own, hitchhiking on boats of the San Diego tuna fleet. They are reporting their observations to scientists at the Scripps Institute.

## New Volcano Is Continental

When scientists Mr. Richards and Mr. Walker returned to La Jolla, Calif., from their exploration of El Boqueron, they had plenty to tell their associates and friends at the Scripps Institute of Oceanography.

Dr. Francis Shepard, professor of marine geology at Scripps, expressed particular interest in their samples of the lava found in the volcano. Investigation proved it to be acidic.

Dr. Shepard said this showed the volcano is of a continental rather than an oceanic type. This is surprising inasmuch as San Benedicto rises from the Pacific Basin and is not a part of the continental shelf.

Mr. Walker reported that he found no life on the island but ran across some peculiar tracks. He described them as holes that looked as if they had been made with an ice pick. He ascribed them to land crabs, although he did not see any of the species around.

Science News Letter, January 10, 1953

A shortage of rice is one of the most serious aspects of the world grain situation.

By equipping ocean-going vessels with long rails of magnesium, engineers have cut the hull *corrosion* that otherwise requires periodic dry-dock attention.

## SCIENCE NEWS LETTER

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## PSYCHOLOGY

**Study Eating Pattern to Prevent Mental Illness**

► WHEN SCIENTISTS understand better the meaning of the way people eat, they may be able to cure many different psychological disorders and thus reduce the amount of mental and emotional sickness.

This prediction was made by Dr. William Kaufman of Bridgeport, Conn., at the meeting of the American Association for the Advancement of Science in St. Louis.

For example, in times of emotional stress many people will drink more milk or eat more ice cream and cheese. They are, Dr. Kaufman said, unconsciously increasing their intake of "security foods."

People who are thwarted or have failed to gain the approval of others, or who feel sorry for themselves, may unconsciously seek gratification by eating more "reward foods" such as chocolate, hot dogs, candy or nuts.

Some persons have the unconscious need to emphasize their adulthood through "overdetermined use of grown-up foods such as coffee, tea or beer, foods which once upon a time were forbidden to most of us," Dr. Kaufman said.

By watching which categories of foods people eat and how they eat, whether they pick at their food, gulp it down, send it back to be cooked more or differently, and so on, psychologists can, Dr. Kaufman thinks, learn more about the individual's unconscious needs and thus be better able to help him with his problems.

Merely furnishing foods that contain recommended allowances of nutrients, such as vitamins, minerals and so on, is not enough, he said, to insure good nutrition and good emotional balance.

Science News Letter, January 10, 1953

## ASTRONOMY

**Ringed Planet Saturn Larger Than Realized**

► SATURN, THE ringed planet, is larger than people have realized.

Latest calculations show that this planet, its rings and satellites, is 95.33 times as bulky as the earth. Saturn is now visible shortly after midnight as a first magnitude object in the constellation of Virgo, the virgin.

The mass of the Saturn system is 1/3497.64 as great as that of the sun, Dr. Hans G. Hertz of the U. S. Naval Observatory told fellow members of the American Astronomical Society meeting at Amherst College Observatory, Amherst, Mass. This is significantly higher than the value of 1/3501.6 now in use, he pointed out.

The new value is based on observations made from 1884 to 1948 of the path the giant planet Jupiter followed in its orderly wanderings among the stars, and of exactly how much Saturn pulled Jupiter out of its orbit around the sun, Dr. Hertz said.

Science News Letter, January 10, 1953



**"HEAVY SEA" IN MINIATURE** — The "U.S.S. Minorsky" rolls in a "hurricane," duplicating the real thing on a one-fifth scale. By turning a switch, engineers at Stanford University can activate a built-in automatic stabilizer and eliminate the rolling motion in seconds. Water tanks on each side, connected by a large pipe, rush water into whichever tank is on the rising side to give an even keel.

## PHYSIOLOGY

**Mixed Sex Mice**

► IN THE same year that the world was set agog by news of a former GI undergoing surgery and hormone treatment to become a girl, scientists found a "surprisingly large number" of mixed sex cases in a well known and highly pure strain of white mice.

Further studies of these mice, the scientists told the American Association for the Advancement of Science meeting in St. Louis, "may shed light on sex asymmetry in man."

The mice have female structures on one side of the body and male structures on the other. Scientists call them gynandromorphs, meaning they have both female (gyn) and male (andro) form (morph). A total of 17 of these mice have been obtained so far, three of them still alive. Of those that died, one showed mixed sex on one side. In the others, the side which was male was left about as often as right.

For the strain as a whole, less than one in 100 is a mouse of mixed sex, but in matings producing such mice they have occurred about six in 100 times.

In the fruit fly, *Drosophila*, it is possible to produce gynandromorphs, or "sex mosaics," by eliminating one of the two sex chromosomes after the first division of the fertilized egg. Fruit flies have no known sex hormones.

Whether the gynandromorphic mice developed their mixed sex condition on the same basis as the fruit flies, that is, by loss of one sex chromosome after the first division of the fertilized egg, is not known.

Scientists reporting the mixed sex mice were Profs. W. F. Hollander, John W. Gowen and Janice Stadler of Iowa State College, Ames, Iowa.

Science News Letter, January 10, 1953

## AERONAUTICS

**By-Pass Jet Engine Adds More Thrust to Exhaust**

► A NEW-TYPE power plant for speedy jet airplanes has been revealed in London. It employs what is called a "by-pass" system which feeds air into the jet pipes to lower the temperatures of the propulsion gas and give it greater thrust.

In this type of engine only a part of the air picked up by the in-takes is compressed and sent through the combustion chamber. Another part by-passes the combustion chamber, enters the jet pipe behind the engine and mixes there with the combustion gases to give higher propulsion efficiency and lower fuel consumption on the Rolls Royce Conway engine.

Science News Letter, January 10, 1953

## GENERAL SCIENCE

# Science and Politics

**There is great need for resolving the conflicts between scientists and politicians, Dr. Mather declares in his retiring presidential address to AAAS.**

By DR. KIRTELY F. MATHER

Retiring president, American Association for the Advancement of Science, and professor of geology, Harvard University.

*Excerpts from address delivered at the AAAS meeting in St. Louis, Dec. 28, 1952.*

► . . . AT FIRST reading, there are those who might cynically inquire "is there any common ground at all between two such antagonistic fields of activity as science and politics?" Conflicts between scientists and politicians have been so widely publicized in recent months that there might seem to be adequate basis for such a question. Scientists have criticized politicians for their ignorance of the strategy and procedures that have proved so efficient in the progress of science. Politicians have berated scientists for their impractical idealism and have even denounced them as subversive, when they object to security regulations and procedures that seem to them inimical to the continuing development of scientific knowledge. . . .

Surely, all will agree that if the interdependence of science and politics is not as clearly comprehended as it ought to be, something should be done to make their common ground more visible. The time is certainly at hand for a moratorium on mutual recrimination, suspicion and jealousy between scientists and politicians, and for a rebirth of a spirit of fair play, constructive cooperation and mutual understanding among and between both groups. . . .

### "Red Tape Curtain"

Friction between scientists and politicians extends, even more unfortunately, far beyond the area in which the politicians hold the purse-strings and therefore can enact the detailed regulations which the scientists must obey. The Internal Security Act of 1950, popularly known as the McCarran Act, and the McCarran-Walter Immigration Act of 1952 have dropped a "Red Tape Curtain" around the United States, which in many evil ways resembles the Iron Curtain around the Soviet Union. Each of those measures was passed by the Congress over the veto of President Truman. In his veto messages, the President spelled out their harmful consequences to the nation and displayed a far clearer comprehension of the bad effect they would have upon science in America than was displayed by those who voted to enact them. The dire

impact of that legislation upon science in America is so well known to all of you that I do not need to tell that sordid story here.

This whole question of the conflict between intellectual freedom, essential to the further progress of science, and national security, essential to the preservation of our country in this period of real danger, ought to have much more careful study than it has yet received. It is so confused by prejudice, suspicion and fear that it is almost impossible to remove it from the fires of emotion and weigh it on the balances of reason. But unless this is done the welfare of our country will be seriously jeopardized.

### Freedoms Are Relative

Most of the freedoms that we hold so dear are relative freedoms, to be exercised only within more or less clearly defined limits. Some of them have to be abandoned or more sharply restricted in time of war, either hot or cold. The most basic freedom of all is intellectual freedom, the right of a man to think his own thoughts and announce them without fear to those who will listen to him. This is the freedom that is safeguarded by our Constitution's Bill of Rights, although there it is spelled out in terms of freedom of speech, of the press, of peaceful assembly and of the free exercise of religion. It is in fact the very touchstone of democracy, the creator and preserver of the orderly flexibility that makes democracy so much more efficient and desirable than any autocracy. The real test of democracy is not applied by asking questions about the statements embodied in a nation's constitution or the presence or absence of ballot boxes and universal suffrage. If anyone wants to know whether the community, state or nation, in which he resides, is truly democratic, let him ask this question: What actually happens to the member of an unpopular minority when he dares to speak his mind in opposition to the spokesmen of the popular majority?

When that test is applied to the organizations and communities of scientists in the United States, they are found to place well out within the democratic bands of the broad spectrum that ranges from stark autocracy at one end to perfect democracy at the other. In fact, many of the significant new ideas that have led to progress in each sector along the expanding frontier of science have been first proposed by an individual, or a small minority, in opposition to views widely held by large majorities. The novel concepts have been appraised in the market place of public opinion. Each

scientist has been encouraged to form and express his own independent judgment. No hierarchy of academicians has decreed what is orthodox, or branded as subversive any one who deviated from the approved "line." Even though one scientist may strongly disagree with another's opinions, he knows he must defend the other's right to express them, else he will be false to his high calling as a seeker for more accurate understanding of the ways of nature. If the suspicion should enter his mind that perhaps in times of ideological conflict a little thought control might be desirable, he has only to remind himself of the sorry plight of the biological sciences in the Soviet Union.

Intellectual freedom for scientists inevitably conflicts with the necessity for national security. To what extent and in what ways should it be limited? The answer to that \$64 question has thus far been given by the politicians, with woefully inadequate consideration of the scientist's point of view. Political screening is necessary in certain sensitive areas where scientists deal with military secrets. Unfortunately, those areas have been either too loosely or too broadly defined. They should be restricted to the absolute minimum. The ideas of competent scientists, concerning what that minimum should be, ought to have far more respectful consideration than they have thus far received.

### Goal Is Understanding

The nature of the political tests also needs re-examination. The fundamental difficulty here arises from a basic disparity between the mental processes of scientists and politicians. In debates across a frontier, the primary aim of the true scientist is to understand rather than to refute. In such debates, most politicians aim to demonstrate their own worth and insist upon the correctness of their own views, rather than attempt to understand an opponent's ideas. All too few of the politicians in America display the intellectual qualities of political scientists.

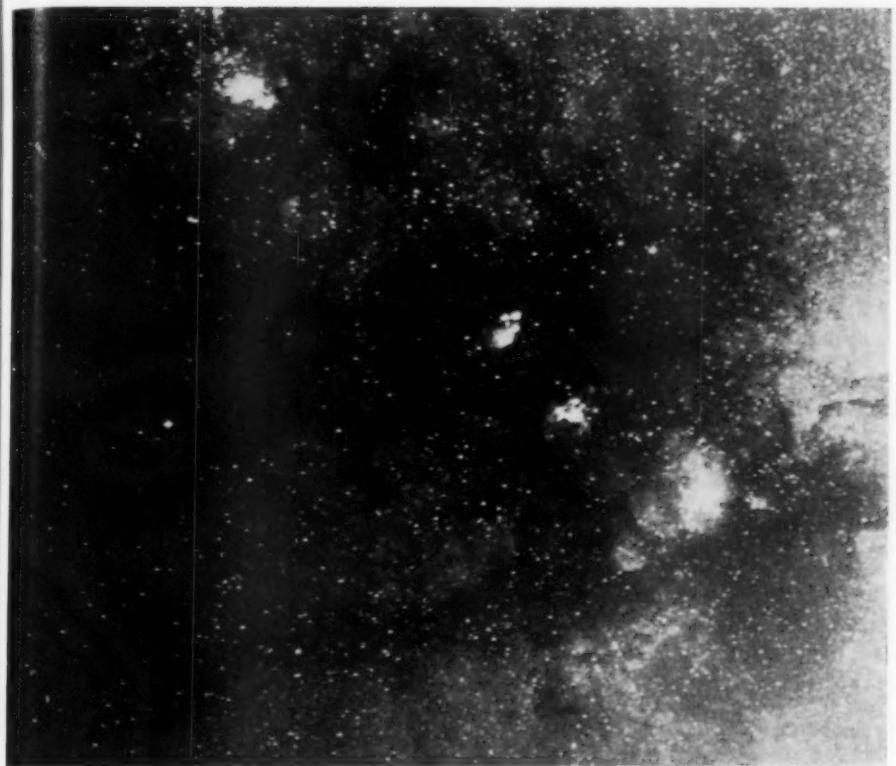
Consequently, the scientist who tries to understand the motives and the behavior of people on the other side of the current ideological conflict is engaging in an intellectual enterprise quite foreign to the politician's mental and emotional habits. He is therefore open to suspicion and will almost certainly be caught by the political screen of "reasonable doubt." There is of course some truth in the well-known saying that a man is known by the company he keeps. But that method of appraisal is valid only when it is taken to mean: a man is known by all the company he keeps. To base conclusions solely upon a man's associations with a few organizations or individuals, specially selected by angry politicians, is both unscientific and unjust. Either all of his associations, or none, should be considered by those responsible for political screening to insure national security.

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**SPIRAL ARMS**—Several regions of bright hydrogen gas, marking the location of the spiral arms of our Milky Way galaxy, show up in this photograph made at the Boyden Station of the Harvard Observatory. They extend in almost a straight line diagonally from upper left to lower right.

#### ASTRONOMY

## Spot Our Galaxy's Arms

Bits of the spiral arms that trail our galaxy have been glimpsed in the southern portion of the Milky Way. Bright hydrogen gas was used as the direction signpost.

► PEERING BEYOND the myriads of stars that surround our solar system with its fiery sun, astronomers are beginning to discover what the pinwheel galaxy to which our earth belongs looks like.

At last they are glimpsing bits of the spiral arms that trail our Milky Way galaxy of stars, shining nebulae and bright gases as this gigantic merry-go-round swings through space.

Sections of the spiral arms that extend out from our watch-shaped system have been spotted in the southern portion of the Milky Way, Dr. Bart J. Bok, Michiel J. Bester and Campbell M. Wade, all of Harvard College Observatory, told the American Astronomical Society in Amherst, Mass.

In the northern part of the Milky Way, that portion seen from the United States and Europe, the existence of two sections of spiral arms was announced only a year or so ago by Dr. W. W. Morgan, Stewart Sharpless and Donald Osterbrock of Yerkes Observatory.

Bright hydrogen gas was used as a signpost to show the direction of the spiral arms in both the northern and southern portions of the Milky Way. As this hydrogen gas has been found to be an outstanding indicator of spiral structure in other spiral galaxies, such as the Great Nebula of Andromeda which we can see out in space, the spiral arms of our own galaxy can probably best be traced through these patches of glowing gas.

Photographs taken at Harvard's Boyden Station in Bloemfontein, South Africa, show that the bright regions follow very closely along the equator of the Milky Way as it stretches across the southern sky.

No areas of glowing hydrogen gas were found more than four degrees from the central band of the Milky Way.

The bright regions, however, are not always seen projected against the brightest parts of the visible band of the Milky Way. Occasional dark patches of gas between us and the Milky Way blot them from view.

While there is evidence of considerable inner spiral structure, it is still too early to state exactly how the inner spiral arms are located, Dr. Bok said. We probably see at least two sections of inner spiral arms with a clear gap in between them.

The exact nature of these arms and their precise orientation, however, will not be known until further spectral and photoelectric studies have been made to determine the intrinsic brightness and distances of the blue-white supergiant stars that excite these nebulosities. Such studies are now under way at the Boyden Station.

The section investigated by the Harvard astronomers lies between the Southern Coal Sack and the Scutum Cloud, well-known objects in the southern sky. An adjacent section of the Milky Way is now being photographed to see if additional portions of the spiral arms can be detected.

Hydrogen gas was found to glow brightly in that portion of the Milky Way between galactic longitudes 250 degrees and 265 degrees, in the southern constellations of Carina, the ship's keel; Crux, the southern cross; and Centaurus, the centaur. Patches of bright hydrogen likewise are strong and abundant between longitudes 300 degrees and 345 degrees, Dr. Bok stated. Here 16 certain regions of bright gas and ten additional probable areas were found.

Little evidence of spiral structure, however, was found in the Milky Way between longitudes 265 degrees and 300 degrees.

Science News Letter, January 10, 1953

#### PHYSIOLOGY

## Proper Muscle Control Can Prevent Heart Ills

► COMMON FORMS of high blood pressure, stomach ulcer, neuroses and even coronary heart disease can be prevented if people can learn to control their own body machinery as well as the motorist can control the horsepower under the hood of his car.

This prediction was made to the American Association for the Advancement of Science meeting in St. Louis by Dr. Edmund Jacobson of the Laboratory for Clinical Physiology, Chicago, author of a book on "Progressive Relaxation."

Mental operations are not conducted exclusively in the brain and other parts of the nervous system as has been thought, Dr. Jacobson said. Certain muscles are tensed in imagination. In anxiety, others are tensed. Relaxation of the specific muscles involved will serve to reduce the imagination or the anxiety.

But, if you let your muscles become tensed without control, this can produce not only spasms of the muscles of the digestive apparatus or of the blood vessels, but also mental states like anxiety or fear, Dr. Jacobson said.

By learning where the controls are to put the brakes on your muscles, he explained, you can learn to run yourself more effectively with less wear and tear.

Science News Letter, January 10, 1953

## ASTRONOMY

**Thermometer Takes Temperatures of Stars**

► FEVERISH STARS will have their temperatures taken with greater accuracy through a photoelectric cell thermometer.

The new temperature-taking device was announced by Dr. Donald A. MacRae of Warner and Swasey Observatory, the Case Institute of Technology, at the meeting of the American Astronomical Society in Amherst, Mass. It is capable of detecting differences in temperature of only a few hundred degrees, a small amount when a star's temperature runs up into thousands and even tens of thousands of degrees Centigrade.

Hot stars are known to have a bluish hue and give off more blue light than cooler, yellow stars like the sun. Thus, temperatures obtained with the new instrument are based on the colors of stars and total amount of heat from the star that reaches the earth.

A prism placed in front of the telescope spreads the star's light out into a spectrum of colors, Dr. MacRae explained. When a narrow slit is moved along the star's spectrum from red to violet, the intensity of the light falling through the slit at any position is measured by a sensitive photoelectric cell. In this way small differences in the relative amounts of light of different colors can be measured accurately.

The photoelectric method of measurement is much more precise than the earlier photographic methods, Dr. MacRae pointed out. With this equipment slight irregularities or peculiarities in certain kinds of stars can be detected.

Science News Letter, January 10, 1953

## PEDIATRICS

**Eight-Man Team for Cleft Palate Baby**

► THE BABY born with a cleft palate and, maybe, a harelip can be helped to grow up into a person who "can ask for a job with a smile and a clear voice, without mental reservation," Dr. O. W. Brandhorst, dean of Washington University School of Medicine in St. Louis, declared at the meeting of the American Association for the Advancement of Science in that city.

Team play or cooperation of eight different medical specialists, however, may be needed to fulfill this hope of every cleft palate patient. The eight Dr. Brandhorst listed are: 1. the pediatrician in guiding the health under severe conditions; 2. the surgeon in providing surgery, when needed; 3. the educationist in his educational efforts under trying conditions; 4. the dentist in preserving oral tissues as a foundation for the future; 5. the orthodontist in adjusting tooth position and arch form; 6. the prosthodontist in supplying a dental prosthesis for missing parts and speech aid; 7. the speech pathologist in speech training; 8. and

possibly the psychologist or the psychiatrist, or both, to give reassurance in the field of social adjustment.

All eight or nine may not be needed in every case, but in some they will be, Dr. Brandhorst stated.

The cleft palate patient, he pointed out, has "entered the world handicapped not by loss of tissue necessarily but by a lack of it." In this respect he differs from a person who, through accident, has lost tissues which he had and which functioned normally for him for a time, for example, the cripple who has lost a leg or the soldier who has had part of his jaw shot away. So Dr. Brandhorst thinks one should speak of "habilitation" for the cleft palate patient and "rehabilitation" for those who have lost tissues they once had.

Science News Letter, January 10, 1953

## PSYCHOLOGY

**Pass Around Tasks To Up Production**

► MORE THAN one out of four workers in American industry are bored by the repetitive jobs they have to do. But psychologists are upping production and making employees happier by the simple expedient of passing around the various kinds of tasks.

New ways of fitting the industrial machine to human beings were reported by Dr. Morris S. Viteles, psychology professor of the University of Pennsylvania, at the sessions of the American Association for the Advancement of Science.

First of all, Dr. Viteles advised that less intelligent people be picked for monotonous jobs, because they are less susceptible to boredom. Personnel managers and industrial executives already have caught onto this. Many people are finding machine-like, speed-regulated work challenging.

But the main method of making factories happier is to use the trick of what Dr. Viteles calls "changing the work situation." This means that a girl is changed, during the day, from making cigarettes to cutting them, or a clerk is shifted from one kind of routine work to another to vary the job.

Rest pauses help alleviate boredom, and the tempo of the work can be adjusted to the need of individuals without loss of efficiency.

The dangers of monotony did not arise with the modern industrial age, Dr. Viteles said, because throughout the ages a large proportion of the work of the world has been repetitive.

Today, despite the intensification of repetitive work by machine, the situation may be better than in the past because of the shorter working day, higher standards of living, and better recreation and educational facilities.

Playing music as a background in the factory does not significantly decrease or increase output, late studies show. But most employees like it.

Science News Letter, January 10, 1953

**IN SCIENCE**

## BIOLOGY

**Make Phase Photographs Of Living Chromosomes****See Front Cover**

► SHOWN ON the cover of this week's SCIENCE NEWS LETTER is a photograph, believed to be the first made in the living state, of the anaphase step in division of a cell in the anther of the spiderwort plant.

The clarity and detail of this and similar photographs, Dr. A. M. Winchester of Stetson University, DeLand, Fla., reported to the American Association for the Advancement of Science, are probably better than those from stained preparations.

For many years, scientists have had to depend upon killed and stained tissues for knowledge of the chromosomes, tiny bodies within cells that carry the hereditary genes. Such treatment, it was feared, might alter the nature of the cells to give an erroneous picture.

Dr. Winchester used a special experimental phase microscope at Harvard University to take his pictures of chromosomes in living cells. Details of the method of shortening and thickening of the chromosomes as they prepare for division was a major point brought out by his study.

Science News Letter, January 10, 1953

## TECHNOLOGY

**Must Design Machines To Fit Their Operators**

► MACHINES MUST be designed to fit their operator's capabilities and limitations or else some of the gadgetry that has been included to get better results may go to waste.

Machines are not replacing men; they are merely changing the nature of their work, Dr. Jack W. Dunlap, president of Dunlap and Associates, Inc., Stamford, Conn., reported to the American Association for the Advancement of Science meeting.

Machines relieve workmen of some muscular effort, routine work, rapid computations and some fine discriminations, but require more dial-watching, panel-monitoring and machine maintenance. Failure to consider the human element can result in serious curtailment of machine performance, he said.

One undisclosed firm requested plans for a new control room in which operator comfort, ease of operation, accuracy and efficiency of operation were to be considered. Subsequent statistics show the control room is recovering its complete design and construction costs every 60 days with increased production.

Science News Letter, January 10, 1953

# ENE FIELDS

## BIOLOGY

## Viruses "Order" Reproduction of Cells

► VIRUSES DO not reproduce themselves, but chemically "order" the cells they are found in to carry out the reproduction.

Describing his studies on the tobacco mosaic virus, Dr. Barry Commoner, Washington University biologist, told the American Association for the Advancement of Science meeting in St. Louis that viruses, like chromosomes or other reduplicating agents in cells, can control the basic chemical processes of the cells in which they are found.

In this way, the virus attains the extreme limit of parasitism, Dr. Commoner said. A virus not only takes its raw materials from the host cell, but it controls the chemical processes of host cells to cause itself to be reduplicated.

When tobacco mosaic virus enters a tobacco cell, this non-living protein starts a strange chemical process going in the host. First, ammonia in the cells begins to collect around a cell particle. Then other cell substances are broken down and their ammonia gathered.

This ammonia furnishes the core for synthesis of new type protein substances which eventually end up as more tobacco mosaic virus. Dr. Commoner said that chemical reactions occurring in the virus-infected cell balance with reactions in a normal cell, indicating that the difference is only in kind of protein made.

Dr. Commoner said that viruses and chromosomes or other reduplicating agents in cells exhibit similar characteristics, so much so that a virus can be figuratively thought of as a "free hereditary agent." Thus study of viruses may lead to greater understanding of the way chromosomes and other cell reduplicating agents work.

Science News Letter, January 10, 1953

## ELECTRONICS

## Guided Missiles Can Overcome Own Errors

► GUIDED MISSILES can now carry inside them complicated gadgets which will make up for any navigation errors caused by mistakes in manufacturing parts. The same controls can account for side winds, changes in air density and other unexpected atmospheric events that would throw the guided missile off target.

This is revealed by Capt. Robert W. Fye, an instructor in guided missiles at Fort Bliss, Tex.

The best of these systems, but also one of the most complicated, accomplishes the task without any help whatsoever to the missile

from outside during the course of the flight. Outside help, in the form of LORAN or from the stars can be interfered with, the first by the enemy, the second by the elements.

For the basis of this internal navigational system, the guided missile scientists went all the way back to Newton and his second law of motion. This says that force equals mass times acceleration. Devices, called accelerometers, in the missile measure the rate of acceleration at which the missile is deviating from its appointed path. They send signals to the steering mechanism that will put the missile back on the correct path to the target.

The drawback to this system, Capt. Fye states in *Antiaircraft Journal* (Nov.-Dec., 1952), is the complexity of the equipment necessary to it. Other systems, based on presetting the course, on use of a magnetic compass, or on radio or the stars, however, make for errors in navigation.

These navigation devices are all designed for surface-to-surface, or SSM, missiles.

Science News Letter, January 10, 1953

## BIOCHEMISTRY

## Nitrogen Grabbers Taken From Intact Plant

► CHEMISTS ARE delving into one of nature's most important secrets—how living things can capture nitrogen gas from the air and turn it into the raw materials of growth.

Dr. R. H. Burris, biochemist at the University of Wisconsin, told the American Association for the Advancement of Science meeting in St. Louis that recently developed methods for removing nitrogen-grabbing factors from a whole plant have sped up research in this important life process.

Nitrogen compounds in the soil are the basic ingredients of living tissue. When nitrogen compounds are removed from the soil by farming, or carried to the sea by erosion, the soil becomes impoverished.

Nitrogen gas in the air, however, is "grabbed," or fixed, by many living things, like leguminous plants and many bacteria, to return nitrogen compounds to the soil.

Biochemists are now attacking the problem of what are the chemical steps lying between free nitrogen gas in the air and its final form as nitrates or nitrites in the soil.

Dr. Burris said that ammonia has been found to be one of the key intermediate states in nitrogen fixation. The importance of ammonia, Dr. Burris said, is that it combines with carbon groups to form organic nitrogen compounds.

Further research is going on now to discover the steps that lie before and after ammonia formation. A recent big step in understanding nitrogen fixation has been a technique for removing the nitrogen-fixing nodules of leguminous plants without impairing the fixation properties of the nodules. This offers a simplified system for study, as the intact plant can be replaced by the detached nodule, Dr. Burris said.

Science News Letter, January 10, 1953

## BIOCHEMISTRY

## Lost Enzyme Seen As Cancer Cause

► LOSS OF an enzyme chemical from some body cells may be the cause of cancer.

Studies supporting this theory of the cause of cancer were reported by Dr. James A. Miller of the University of Wisconsin at the meeting of the American Association for the Advancement of Science in St. Louis.

Cancer researchers have for years thought that the reason cancer cells multiply without the restrictions of normal cells is that some chemicals in the cells or some genes are changed when the cells become cancerous.

Dr. Miller's theory is that a chemical is somehow lost entirely from the cell. This chemical, perhaps an enzyme, according to this theory is the growth self-governor of the cell.

Support for the theory comes from studies of rats that get liver cancer when fed an azo dye. The dye, Dr. Miller said, combines with and possibly destroys the chemical effectiveness of certain proteins necessary for control of growth but not for life.

If this continues, cell generations might arise, he said, which lack entirely one or more normal growth control chemicals. These cells could respond to continued nourishment only by continuing to grow and would thus be tumor or cancer cells.

Science News Letter, January 10, 1953

## PSYCHOLOGY

## Sound Thinking Possible Without Logic Training

► THE ABILITY to reason logically depends on native intelligence as well as on formal training in logic.

This conclusion is based on an experiment with government employees reported by Dr. and Mrs. William J. Morgan, consulting psychologists of Merrifield, Va., to the American Association for the Advancement of Science meeting in St. Louis.

The 134 government workers were given a test of logical reasoning. They were divided into two groups according to whether or not they had had formal training in logic. Each person in the logic-trained group was matched for sex, age and college degree with an individual in the group without such training.

Those without logic training did 73% as well on the test as the group with such training. And 38% of those without training got higher scores than their opposite numbers in the group who had received college courses in logic.

Nine persons with Ph.D. degrees who had not had training in logic obtained higher scores than those with lower degrees, even though the latter had had such training.

There is great variation among college graduates in ability to think logically. Some received scores 70 times as high as others.

Science News Letter, January 10, 1953

## PSYCHOLOGY

# Teach Backward Children

**Brighter future foreseen for nation's mentally retarded children as scientists attack problem through prevention and training. More than half are born to normal parents.**

By J. M. MacDONALD

► CAN MENTAL deficiency be prevented?

The answer to this important question affects every community in the United States. In our elementary schools alone, the U. S. Office of Education estimates that at least 20% of American children are so sufficiently retarded as to require some adaptation of their education.

Of persons of all ages so affected, only 10% are in any kind of school or institution. And, until recently, very little was being done about the other 90%, the majority of whom are beyond school age and "staying at home."

In scores of towns and cities across the nation there has been a recent upswell of public awareness concerning this problem. More and more communities have begun to realize the large number of families affected and are trying to do something about the suffering, social distortion, and economic waste involved.

As a result, parent groups have been formed; small parents-supported classes and guidance centers have been started; in many communities public school systems have instituted special education classes; a number of colleges now have training courses for teachers of retarded children; in a number of schools and colleges research institutes have been organized to help meet and combat the problem.

### The Training School

Probably the best known of all the research centers in this field is The Training School at Vineland, N. J., a non-profit, private school established in 1888. Here is where the Kallikak study was made; where the term "moron" originated; where the Binet intelligence tests were translated and standardized for American use; where the U. S. Army's Alpha and Beta selection tests were first tried out; where the Vineland Social Maturity Scale, used around the world, was developed; where initial studies in birth injury (cerebral palsy) were instituted.

Each year hundreds of study visitors come to the Vineland school from all parts of the world to observe education and training procedures and to visit its research laboratories. Each month findings in the field of mental retardation are published in The Training School Bulletin which reaches readers in every part of the globe.

Studies pursued at Vineland indicate that more than half of the nation's mentally re-

tarded children are born to normal and superior parents. This has led to extensive experiments in diagnosing and identifying inherited and non-inherited types of mental deficiency since training methods vary widely in these two major categories.

Much of the research at Vineland is directed toward prevention of mental deficiency—a now-recognized "scourge of mankind" which has filled to overflowing state institutions and private schools across the nation. Studies in blood chemistry, glandular disturbances, metabolism, fetal infections, birth injuries, cerebral palsy, mongolism, as well as heredity, have added vastly to the world's knowledge of the problem.

It has been found in pre-natal and post-natal studies at Vineland and elsewhere that malnutrition, measles, meningitis, whooping cough, convulsions, Rh blood factor, epilepsy, polio, falls during pregnancy, premature babies, difficult labor, instruments used during birth, and many other conditions may contribute to children being born with varying degrees of mental retardation.

Members of the Vineland research staff

are now at work on a long-range study of difficult labor in childbirth, in collaboration with the University of Pennsylvania's Departments of Obstetrics, Pediatrics and Psychology. Specific factors, such as cephalopelvic disproportion, are being examined in case after case to determine possible brain damage to newborn infants.

"In years to come, if we can help prevent some of these conditions and increase the rate of normal births by many thousands, our years of work will be well repaid," Dr. Walter Jacob, director of the Vineland school, told SCIENCE SERVICE.

### Many Needs Urgent

"Urgent now," he said, "are the vast, unmet needs of those retarded children who have already been born and who are entitled to the kind of education, training, and medical care from which they can profit most." He stressed the importance of detecting mental deficiency at the earliest age possible. After a child's handicaps are fully diagnosed, training should begin and continue on and on, as long as any gains are being made.

"Every clue as to how these children can be helped must be pursued. Contributions from parents, physicians, teachers, occupational and speech therapists, vocational counselors and training supervisors, as well



**OBJECTS ASSEMBLY TEST**—One of a series of tests included in the Wechsler Intelligence Rating Scale is shown being given to a child in the research laboratories of The Training School at Vineland, N. J.

as from playmates and friends, are important in giving the fullest picture possible of the individual child's needs. Only through such carefully planned teamwork can handicaps be minimized or eventually removed. For those whose handicaps cannot be overcome or reduced appreciably, he pointed out that ways are being found to work around such handicaps or to compensate for them.

"I have always believed, and many of my colleagues agree with me," Dr. Jacob said, "that a large proportion of mentally retarded persons need not be a loss to society. Many of them can be taught useful work which helps them and their families, especially in those years when they get beyond school age."

## PUBLIC HEALTH

## X-Rays Spot Insects

► X-RAYS ARE helping to give us cleaner bread and cereal products, from spaghetti to cookies.

Wheat kernels, or grains, that look perfectly clean when you pick up a handful and inspect them may, nevertheless, have insects inside them. When such kernels are ground into flour, the insects are ground along. Bits of ground insects, only visible under a microscope, then get into the bread or other products made from the flour.

The insect-infested wheat kernels, however, can be detected by X-rays. U. S. Food and Drug Administration authorities are now using the X-rays in their watch over the purity of our food supplies.

The X-rays used for this purpose are a special kind. The ones used by your dentist, for example, are much too hard and intense. Such X-rays would go right through the wheat kernel without giving a picture of the holes made by the insects.

Scientists at Kansas State College, Manhattan, Kans., discovered that X-rays, which had been tried unsuccessfully before, could be used for this purpose if soft, or low voltage X-rays were used. The kind they recommended and which Food and Drug officials are now using are like the ones used in the metal casting industry to detect flaws in thin sheets of metal.

The FDA got to the X-raying of wheat kernels by a reversal of its usual process. Instead of going to the source of a contaminated product, it had started with bread, rolls, cookies and bakeries. Finding bits of ground-up insects in such products when inspected under the microscope, it got the bakeries to clean up. But the ground-up insects still appeared in the bread. So FDA went to the flour millers. But even from clean mills, insect-infested flour came out. With the new X-ray technique, FDA is now going to the source, wheat after it is harvested.

Wheat that comes from the fields without insects gets infested during subsequent handling, as when stored on the farm, in grain or terminal elevators, or freight cars.

"During the war many did capable jobs in industry, particularly in routine, repetitive tasks in which they often excelled normal workers. They often can do good work, too, in the less complex vocations."

Since World War II, many states have passed legislation and have instituted programs for their mentally retarded constituents. Others have broadened existing programs. In 1949, only 18 states had laws or official standards governing the education of mentally handicapped persons. Today 32 states and Hawaii have such provisions.

These gains are decisive and encouraging. They point to a brighter future for all retarded children and are significant steps in the nation's social progress and economy.

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"They have handled wheat like crushed rock or sand, instead of food," one FDA official declares.

The wheat and other cereal industries are expected to gain from the new X-ray process through the saving in grain that would be a loss because of insect contamination. Wheat badly hollowed out by insects is not worth milling because not enough flour can be got out of it.

Oats, rice, corn and rye can also be inspected by the X-rays. One large cereal manufacturer bought one X-ray machine to examine its grain for insects before processing. The X-rays showed, in addition, growth cracks and other details which enabled the company to improve its milling practice. As a result, this company's officials have reported the machine more than paid for itself in a few months and two more have been ordered.

Science News Letter, January 10, 1953

## WILDLIFE

## Rabbit Restocking Found Unnecessary

► RESTOCKING OF rabbits can be unnecessary and wasteful, says Dr. Ward M. Sharp of the U. S. Fish and Wildlife Service.

Dr. Sharp found that rabbits can hold their own by natural propagation in the most densely hunted areas, so long as there is a good habitat for them. Out of a known population of 146 cottontails in a study area, only 64 were taken by hunters, Dr. Sharp said. The post-hunting season population at the beginning of breeding was 34 rabbits, more than enough to replenish their numbers.

Thousands of dollars could be saved by abandoning useless restocking of rabbits, Dr. Sharp said, and suggested that this money might be better spent for habitat improvement. Dr. Sharp is working with the Pennsylvania Cooperative Wildlife Unit at State College, State College, Pa.

Science News Letter, January 10, 1953

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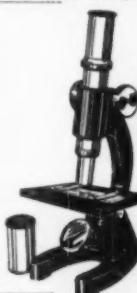


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# Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

**ABC OF CAT DISEASES**—P. M. Soderberg—*All-Pets*, 64 p., illus., paper, 85 cents. Written by a layman to help make cat owners more understanding of their animals' diseases and symptoms.

**ASTM STANDARDS ON TEXTILE MATERIALS: With Related Information**—ASTM Committee D-13 on Textile Materials—*American Society for Testing Materials*, October, 1952 ed., 660 p., illus., paper, \$5.00. This latest edition includes tests on stretch and snag resistance of hosiery.

**ADVANCES IN CARBOHYDRATE CHEMISTRY**—Claude S. Hudson, Melville L. Wolfrom and Sidney M. Cantor, Eds.—*Academic Press*, Vol. 7, 370 p., \$7.50. A compilation of papers reporting recent studies in this field of chemistry.

**ADVANCES IN GEOPHYSICS**—H. E. Landsberg, Ed.—*Academic Press*, Vol. I, 362 p., illus., \$7.80. This first in a series, summarizing recent advances, contains reviews of established knowledge and evaluations of geophysical data. Some of the papers point to the major progress that



### Wins Writing Success Though Crippled with Arthritis

"When I became almost crippled with arthritis, N.I.A. training proved its value. I began acting as local correspondent for two papers. Then, I started a publication of my own, 'The Beekeeper' became a reality and a success. Were I physically able, I would crawl to the top of the house and shout the merits of N.I.A. training."—Elmer Carroll, Route 3, Box 549, Lansing, Mich.

## To People who want to write

### but can't get started

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has been made, while others demonstrate that sciences such as astronomy can contribute to this rapidly expanding field.

**BASIC BIOLOGY FOR HIGH SCHOOLS**—Carroll Lane Fenton and Paul E. Kambly—*Macmillan*, rev. ed., 726 p., illus., \$3.84. Fundamental problems, principles and facts are presented in this abundantly illustrated text designed for a one year course. Important practical subjects are treated in a special unit.

**CYCLAMEN PERSICUM: Its Natural and Cultivated Forms**—Walter C. Blasdale—*Stanford University Press*, 47 p., illus., paper, \$1.50. Contains historical and descriptive information on this increasingly popular house plant.

**DICTIONARY OF CIVICS AND GOVERNMENT**—Marjorie Tallman—*Philosophical Library*, 291 p., \$5.00. Words and expressions are defined and often illustrated by events in American History. Of value not only to the student, but to those who want a better understanding of our government as it operates today.

**THE EFFECT OF CHROMIUM PLATING ON THE ENDURANCE LIMIT OF 4340 STEEL**—George M. Cabble, Jr.—*Virginia Polytechnic Institute, Engineering Experiment Station Series No. 82*, 20 p., paper, 25 cents. Results of investigation showed that a single plating reduced the fatigue limit 21%, and a second plating reduced it another 10%.

**GUÍA DE INSTITUCIONES Y SOCIEDADES CIENTÍFICAS LATINOAMERICANAS: Quinta Parte**, Mexico, Panama y Venezuela—Christina Buechner, Executive Secretary—*Pan American Union*, 39 p., paper, 15 cents. Intended to fill the long felt need for an adequate directory of Latin American scientific institutions. This directory includes institutions concerned with medicine, engineering and the natural sciences, both public and private.

**HOW CHILDREN AND TEACHER WORK TOGETHER**—Elsa Schneider—*Govt. Printing Office, Office of Education Bulletin* 1952, No. 14, 24 p., illus., paper, 15 cents. A successful teacher can establish rapport by working with the children, and the pamphlet gives some of the ways in which this is accomplished.

**AN INQUIRY INTO DOMESTIC HOT WATER SUPPLY IN GREAT BRITAIN: Part 2, The Use of Water Heating Appliances in Summer, and the Relation Between the Usage of Hot Water and the Appliances Available**—F. M. Lea, Director—*Her Majesty's Stationery Office, National Building Studies Special Report No. 14*, 77 p., paper, 75 cents. The typical Englishman takes one hot bath a week and the favorite appliance for providing it is an immersion heater. Only five percent of the British do not take baths.

**METHYL ALPHA-D-GLUCOSIDE DRYING OILS**—John P. Gibbons and Robert A. Janke—*Mellon Institute*, 3 p., paper, free upon request to publisher, 4400 Fifth Ave., Pittsburgh 13, Pa.

**PERSONS AND PERSONALITY: An Introduction to Psychology**—Sister Annette Walters and Sister Kevin O'Hara—*Appleton*, 677 p., illus.,

\$4.50. A college text for the Catholic student of psychology. Designed to help the Christian student reconcile his religious teaching with scientific knowledge.

**REPORT OF THE HYDRAULICS RESEARCH BOARD FOR THE YEARS 1947-1951**: With the Report of the Director of Hydraulics Research for the Years 1948-1951—Claude Inglis, Director—*Her Majesty's Stationery Office*, 39 p., illus., paper, 75 cents. A summary of various research projects relating to coast erosion, flood protection and other civil engineering problems.

**REPORT OF THE MECHANICAL ENGINEERING RESEARCH BOARD**: With the Report of the Director of Mechanical Engineering Research for the Year 1951—D. G. Sopwith, Director—*Her Majesty's Stationery Office*, 37 p., illus., paper, 50 cents.

**TOWARD A REGIONAL PROGRAM OF PUBLIC HEALTH TRAINING IN THE SOUTH**—Philip G. Davidson, Chairman—*Southern Regional Education Board*, 47 p., paper, 50 cents. A report by the Committee on Public Health Training studying the needs and opportunities in training for public health.

**WATER SUPPLY AND PURIFICATION**—W. A. Hardenbergh—*International Textbook Co.*, 3rd ed., 516 p., illus., \$6.50. New materials and developments have necessitated rewriting a number of chapters. Included is a new chapter on fluoridation.

**YOUR FARMHOUSE—CUT-OUTS TO HELP IN PLANNING**—U. S. Dept. of Agriculture—*Govt. Printing Office, Home and Garden Bulletin No. 22*, 55 p., illus., paper, 30 cents. In this new edition, designed to help you visualize your future home, there are plans suggesting ways to meet indoor traffic problems. Includes floor plans for different types of houses and cut-outs of furniture and equipment.

Science News Letter, January 10, 1953

### BACTERIOLOGY

## Chemicals "Return" Bacteria to "Life"

► **BACTERIA "KILLED"** by ultraviolet irradiation have been "returned to life" by exposing them for 24 hours to sodium pyruvate and similar chemicals.

Three scientists of the Naval Medical Research Laboratory at Camp Lejeune, N. C., F. Heinmets, J. J. Lehman and W. W. Taylor, told the American Association for the Advancement of Science meeting in St. Louis that bacterial suspensions considered sterile by all usual standards were reactivated by pyruvate and other cellular metabolites.

This discovery points up unrecognized dangers in the re-contamination of sterilized objects by contact with chemicals. "This re-contamination could have dangerous effects in disease prevention and public sanitation," the scientists said.

A possible benefit from this recovery of bacteria after irradiation may be to increase our knowledge about the effects of irradiation on higher animals, including man, they said.

Science News Letter, January 10, 1953

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## ASTRONOMY

# Earth Predates Some Stars

**Astronomer-mathematician presents new theory of creation of universe, estimates that small astronomical systems came into being earlier than large ones.**

► THE EARTH and other planets in our solar system are much older than many of the stars in our Milky Way galaxy of stars and nebulae, Dr. David Layzer of Princeton University told members of the American Astronomical Association meeting in Amherst, Mass.

"Small astronomical systems came into being earlier than large ones," Dr. Layzer stated in presenting his new theory of how the universe such as we know it was created.

The great cluster of galaxies, each containing a myriad of stars, in the constellation of Virgo, the virgin, will one day become a cog in a much larger wheel, the Princeton astronomer-mathematician predicted.

The universe began with matter in gaseous form uniformly distributed through space, Dr. Layzer believes. This gas began to expand some two billion years or so ago, and will continue to expand for billions of billions of years. But sometime in the distant future there will be more contraction than expansion. The expansion-contraction cycle is repeated every ten billion years, he calculates.

Dr. Layzer visualizes the universe, which is ten billion trillion times as massive as the sun, as being created in this manner:

"As the universe expands, small condensations form, releasing just enough energy to maintain the expansion. As the expansion continues these condensations converge into clusters of condensations, these in turn into larger clusters, and so forth. In short, the expansion generates a hierarchy of rather loosely-knit clusters within clusters."

"The coming together of small clusters to form a large cluster gives rise to disruptive tidal interactions among the small clusters. These persist, of course, even after the large cluster has itself become a member of a

still larger cluster. Thus energy is continually funnelled from the clusters of every given level of the hierarchy to the smaller clusters on the next lower level."

Such systems do not always build up into larger ones, however, but sometimes dissolve. When a cluster gains energy, it becomes less compact and is more easily dissolved by tidal disruption, Dr. Layzer pointed out. When a cluster loses energy, it becomes more compact and less susceptible to tidal disruption.

In addition to clustering and funnelling, Dr. Layzer considers that gravitational contraction also played a vital role in the evolution of stars and the solar system.

The key to Dr. Layzer's theory of the creation of the universe is a continuing supply of energy liberated by the local clustering of matter. Mathematically, he has calculated the energy of an "expanding, homogeneous, spherical Einstein universe," and believes the result bears out his premise.

Science News Letter, January 10, 1953

## PSYCHOLOGY

## Psychologist Reports "Mom" Blaming Childish

► MOM IS not necessarily to blame for the psychological quirks of her children. Parents as well as children have rights.

Psychologists and psychiatrists were taken to task for their mother-blaming complexes of recent years by Dr. Jane Loevinger, Washington University psychologist, speaking before the American Association for the Advancement of Science meeting in St. Louis.

Parenthood should be recognized for the sake of mothers and fathers as well as for children, she argued. Parents are not of interest merely for the sake of the child. Adults who have children are people as well as parents.

In reading "how to be a perfect parent" books, each parent chooses that advice on how to raise children least appropriate to him, she finds. Each parent seeks rationalizations for the most irrational aspects of his behavior.

Mothers who read about child-rearing are those who are already overburdened with conscience. Dr. Loevinger believes this emphasis on child's rights and mother's duties serves to increase the anxiety difficulties of parents.

The mother-blaming complex, Dr. Loevinger suggested, is an aspect of immaturity, just as much as the traits of the child that are labeled "momism."

Science News Letter, January 10, 1953

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## BIOPHYSICS

# Jaw Bone Fluid

**Make first measurements of the electromotive force, resistance and electric current generated by a filling, with the jaw bone fluid acting like the battery liquid.**

► THE FLUID in jaw bones can act like battery fluid, and a single gold or silver amalgam filling in the mouth constitutes an electric cell.

First measurements of the electromotive force, resistance and electric current through the filling in the case of such cells were reported by William Schriever, professor of physics at the University of Oklahoma at Norman, Okla., at the meeting of the American Association for the Advancement of Science in St. Louis.

The current, although very small, is enough to cause pain and irritation in the mouth, gums and tongue, as dentists have found.

With a specially devised electrometer-tube potential difference meter, Prof. Schriever was able to get usable data on 78 single fillings in the mouths of 66 persons from 18 to 30 years old.

The largest observed values of each of the electrical quantities reported for a gold filling are: resistance to bone, 0.31 megohm; resistance to saliva, 1.4 megohm; total resistance, 1.5 megohm; normal electric current, 1.07 microamp; electromotive force, 245 mv. One megohm, Prof. Schriever explained, is one million ohms, 1 mv is one thousandth of a volt, and 1 microamp is one millionth of an ampere.

The figures for amalgam filling are: resistance to bone, 0.42; resistance to saliva, 1.7; total resistance, 2.0; normal current, 3.4; electromotive force, 160.

The single metallic dental filling, contacting both saliva and bone-fluid, Prof. Schriever explained, constitutes an electric cell because the bone-fluid contacts the saliva through the tissue outside the tooth.

The kind of trouble that can be caused by metallic fillings is illustrated in a report from Dr. G. Aasgaard of Bergen, Norway. His experience, Prof. Schriever related, was with a patient who had a four-piece gold bridge and two large amalgam (silver) fillings with a potential difference of 330 mv between the bridge and one amalgam filling. Symptoms, such as irritation of the gingiva (gums) and the tongue, existed and the patient complained of pain in the tongue and in the palate.

When the two amalgam fillings were replaced by baked porcelain, the pain in the palate disappeared and the pain in the tongue was less. The gold bridge was removed and an amalgam filling was found under a gold crown. When this amalgam restoration was replaced with gold, the pain disappeared, the tongue regained its normal appearance, and the patient has remained without symptoms ever since.

The potential difference between two gold restorations was around 70 mv. This report indicates that the galvanic electrical effects due to dissimilar metallic dental restorations may cause pathologic conditions in the mouth.

Science News Letter, January 10, 1953

## GENERAL SCIENCE

## Scientist Supply Doubled in 12 Years

► THIS NATION has doubled the number of its scientists in the past 12 years. So has Russia.

The supply in this nation is still short of the demand and will remain so for several years to come. So Dr. Dael Wolfe, director of the Commission on Human Resources and Advanced Training, told the American Association for the Advancement of Science.

We now have about 200,000 scientists, about 46,000 of whom have earned Ph.D.'s or the equivalent, Dr. Wolfe revealed. To this may be added about 500,000 engineers and about 300,000 physicians, veterinarians and others in the health field.

"We can take considerable satisfaction in the amount by which we have expanded our own scientific resources in the past dozen years," Dr. Wolfe said. "But the USSR can take as much satisfaction in its efforts. The comparison gives no grounds for complacency that we have insured our continuing scientific superiority."

Looking ahead, Dr. Wolfe saw the most optimistic picture as being in the production of new Ph.D.'s. During the years just ahead, he said, we will have three times as many Ph.D. scientists with from three to eight years of experience as we have had during the recent past.

"Within this young and vigorous group we can expect to find many good research investigators and many good project and laboratory directors," he pointed out.

However, the production of scientists with bachelor degrees, needed to help the Ph.D.'s and to teach neophyte scientists, is not so good. During the next five years, about 190,000 will receive bachelor's degrees, only about two-thirds as many as in the past five years. Many of these are in ROTC or have been deferred to complete their college educations and therefore will be in the armed forces. Some have no intention of being scientists, some will marry and some will become teachers. Only a comparatively small number will be available for immediate scientific work.

Science News Letter, January 10, 1953

## • RADIO

Saturday, Jan. 17, 1953, 3:15-3:30 p.m., EST  
"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

John Stack, assistant director of the Langley Aeronautical Laboratory, National Advisory Committee for Aeronautics, Langley Field, Va., discusses "Designing Faster-Than-Sound Airplanes."

## AGRICULTURE

## Quality Independent Of What Soil Contains

► QUALITY OF soil has no significant effect on the quality of food grown on it, Dr. L. M. Turk, Michigan State College soil scientist, told the meeting of the American Association for the Advancement of Science in St. Louis. And animal products, including milk, reflect soil deficiencies even less than plants, Dr. Turk added.

The closest relation between soil and human nutrition lies in the quantity of food that a soil can produce, he said. Soils deficient in necessary minerals or organic materials cannot produce the amount of food a healthy, balanced soil can.

There need be no alarm about food supply for the nation's increasing population, Dr. Turk said, if good management practices, including proper use of fertilizers and lime, are put into effect.

If all the nation's farm managers worked as efficiently and with as much attention paid to soil nutrients as is done by the upper 10% of them today, our farms could double their output, without using a single acre more, Dr. Turk said.

Science News Letter, January 10, 1953

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## ASTRONOMY

# Circle At Terrific Speeds

Find two giant suns that whiz around each other at very high rates, one having a linear velocity of 190 miles per second, the other, 122 miles per second.

\* TWO GIANT suns, one 5,000,000 and the other 3,000,000 miles across, swing around each other out in space with terrific speeds, yet stay very close together, Dr. Joseph A. Pearce, director emeritus of the Dominion Astrophysical Observatory at Victoria, B.C., reported to members of the American Astronomical Society meeting at Amherst College, Amherst, Mass.

The smaller star moves so fast it could skim around the earth's equator in a little over two minutes. Its linear velocity is 190 miles per second, Dr. Pearce estimates. The more massive star has a linear velocity of 122 miles per second. These enormous bluish stars whiz around each other every 27.2 days.

The two stars circle around each other in a volume of space about equal to that enclosed by the orbit of the planet Mercury, the closest planet to our sun. For two days the stars are only 12,000,000 miles apart,

Dr. Pearce reported, then 13.6 days later they are 79,000,000 miles from each other.

These enormous stars, one 13 times as massive as our sun and the other eight times as bulky, are in the constellation of Orion. Both are very brilliant and very hot, having a temperature of about 22,900 degrees Centigrade. So close together they appear as a single fifth magnitude star, they are so far from us that light which reaches the earth today started on its way from the star about 1,250 years ago.

The difference between the magnitude and intrinsic brightness of the stars, known to astronomers as H.D. 37756, was deduced from a spectrophotometric analysis of their light, Dr. Pearce explained. These data, combined with orbital elements of the binary, permitted the absolute dimensions of the double-star system to be evaluated by Dr. Pearce.

Science News Letter, January 10, 1953

## MOPHYSICS

# Radioactivity Damage

\* NO AMOUNT of exposure to radiation from radioactive products is small enough not to cause some biological damage to living cells, Dr. Karl Z. Morgan of the Oak Ridge National Laboratory told an American Association for the Advancement of Science symposium on radiation hazards in St. Louis.

Even the small amount of radiation man is constantly subjected to from naturally occurring irradiation sources like cosmic rays, causes some damage to cells, although the rate of repair is faster than the rate of damage, Dr. Morgan said.

The maximum amount of external radiation exposure workers with radiation can safely be subjected to is 70 times the natural background radiation per week, he said.

Even this maximum safety rate—0.3 rems, roentgen equivalent man—cannot be allowed as an average exposure for a worker over his entire occupational life, Dr. Morgan said. A worker exposed to 0.3 rems a week over 40 years, would probably have his life span shortened by four years, and would be more likely to have tumors, blood disease and eye cataracts than non-radiation workers.

This maximum permissible exposure of ionizing radiation, however, is not intended for year in, year out radiation work, Dr. Morgan said, but represents the toleration point for fairly short periods of time.

Workers in the Oak Ridge National Lab-

oratory, where many irradiation experiments are going on, average exposure to only 0.012 rems per week, which is four percent of the permissible rate or only three times natural background exposure rate, Dr. Morgan said.

Science News Letter, January 10, 1953

## Do You Know?

There are about 79,400,000 telephones in the world today.

In a year's time in the U. S., the per capita consumption of assorted beverages is nearly 20 gallons, with a net alcohol content of about six quarts.

Prairie chickens perform a spectacular mating dance on ancestral "booming grounds" each spring; their calls echo far across the grasslands.

A bar made of a gold-cadmium alloy can be bent easily when cold, but when heated to about 150 degrees Fahrenheit, it quickly returns to its original shape.

The archery bow is a classic example of a mathematically perfect form, yet its shape probably was created only from the intuition and esthetic sense of the designers.

# Questions

ASTRONOMY—How much more bulky than the earth is Saturn? p. 21.

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GENERAL SCIENCE—What is the "Red Tape Curtain"? p. 22.

\*\*\*

PHYSIOLOGY—Why should people learn to put a brake on their muscles? p. 23.

\*\*\*

PSYCHOLOGY—How can a study of eating patterns help prevent mental illnesses? p. 21. Does training in logic aid in sound thinking? p. 25.

\*\*\*

PUBLIC HEALTH—How are X-rays helping to give us cleaner bread? p. 27.

\*\*\*

VOLCANOLOGY—How was it shown that the new Pacific volcano was of continental type? p. 20.

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Photographs: Cover, Dr. A. M. Winchester; p. 19, Cornell University; p. 21, Stanford University; p. 23, Harvard College Observatory; p. 26, The Training School; p. 32, Calnevar Co.

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**NYLON-CORD CHAIR** weighs only six pounds and has a wooden frame of laminated walnut. Nylon cord forms the chair's back and seat. The well-proportioned chair provides the television watcher with a comfortable and sturdy seat that can be easily carried in one hand.

Science News Letter, January 10, 1953

**SOLDERING IRON**, designed for normal or heavy soldering, heats to working temperature in five seconds and cools so fast it can be put away safely as soon as the job is done. Built into the handle are a light bulb, an off-on switch and a small transformer that provides power for the small tip.

Science News Letter, January 10, 1953

**DRY-LUBRICANT FILM** can be brushed on any machine or instrument surface to provide a lustrous, hard, greasy-feeling but clean coating. Ranging from a fifth to a half-thousandth of an inch thick, the molybdenum-sulfur film will lubricate plastics, glass and ceramics as well as metal.

Science News Letter, January 10, 1953

**WIRE-WHEEL HUB caps**, shown in the photograph, look like the kind put on American-made sports cars that are exported to Europe. Made of stainless steel, the snap-on hub caps cost much less than real



wire wheels and are designed to fit standard cars as well as Detroit's European models.

Science News Letter, January 10, 1953

**PORTABLE SEWING MACHINE**, to be marketed in February, uses a unique system of slip-on plastic disks that permit the unskilled housewife to do some of the most intricate needlework without special attach-

ments. The plastic disks act as little "brains" and instruct the machine in sewing such things as zig-zag stitches, button holes and monograms.

Science News Letter, January 10, 1953

**CHANGEABLE TYPE bars** for electric typewriters now permit the typist to type chemical, mathematical, scientific and foreign language symbols, and exponents and subscripts that do not ordinarily appear on the standard model. The type bars are designed so they can be installed or removed easily and quickly.

Science News Letter, January 10, 1953

**CAR STARTER** switch is especially useful when unexpected stalls flutter the driver. Working on autos having fully automatic transmissions, the device automatically starts the engine when the gear shift is put in "neutral" or "park," and the ignition is on.

Science News Letter, January 10, 1953

**SPOON CRADLE** of aluminum is just the thing for the housewife to keep near her stove for use when she wants to lay down spoons she has been using and not soil the stove. The bright-colored cradle accommodates three spoons at once and catches their drippings.

Science News Letter, January 10, 1953

# Nature Ramblings

► USUALLY, WHEN we talk of birds going south for the winter, we think of their leaving northern lands that will soon be frostbound and seeking warm, sunny regions until spring shall send them north again.

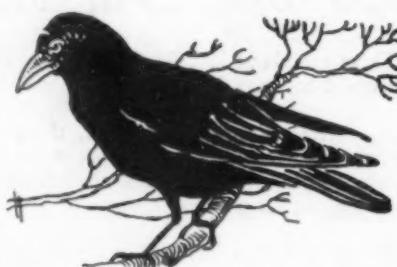
This is the migration of bluebird and oriole, of duck and goose; the pattern is so prevalent that we are prone to think of it as exclusive.

Yet birds are all about, in winter; even the least observant of us sees and hears them. Their presence is apt to be explained by an easy, "Oh, they stick around the whole year."

This is by no means necessarily the case, and of some birds it is not true at all. Whole populations of birds that are seen in the northern states during the snowy season disappear or become pretty scarce in summer; nuthatch and brown creeper, for example, and that mighty hunter of mice, the great horned owl.

Most such birds nest in Canada, though in some species the summer breeding range does extend into the United States a little.

## South for the Winter



In some cases, too, we apply the permanent-resident explanation to a bird species because we see representatives around practically all the time, and assume they are the same individuals. However, what we are likely to have is an overlapping of two migrant populations that do not go very far.

Crows that we see in summer are very apt to flap southward a few hundreds, or perhaps only a few scores, of miles to their winter range. In the meantime their place

in our landscape is taken by other crows from a little farther north. And since all crows look alike to us, we assume that no migration at all has taken place.

The European starling, a recently introduced species that has become a spreading pest, has developed this limited and overlapping migration to a marked degree. The starling flocks that are a wholly undesired feature of the nation's capital in winter are migrants from western New York and Pennsylvania. The capital's summer starling population in the meantime is spending the winter as uninvited guests of communities in North Carolina and southern Virginia.

Occasionally, of course, you will see or hear of a normally migrating bird that has not bothered to migrate at all. Robins that remain through winter, sometimes consorting with flocks of rowdy sparrows, are among the most frequently reported of such cases. This probably represents a response to easily available handouts of food, making the southward trip unnecessary.

Science News Letter, January 10, 1953